Sri Lanka Institute of Information Technology

Assignment 01

MLB_09_01_12

Vehicle Rental System

Information System & Data Modeling – IT1090

B.Sc. (Hons) in Information Technology

PROJECT ID	MLB_09_01_12
CASE STUDY NAME	Vehicle Rental System
CAMPUS/CENTER	Malabe

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Hypothetical Scenario

We want vehicles for our daily travelling. Today people usually use their personal vehicle and rental vehicles.so this online vehicle website provide lot of vehicles at the cheapest price. Because customers can buy vehicles from this website. Customers can search for a vehicle type through a web browser and then rent it out.

This online vehicle system provides several types of luxury vehicles and system administrator can main the vehicles category list and update the new vehicles detail. There are two types of users who can use our online vehicle rental system. They are registered users and guest users. If any user wants to be registered user, that user has to login tab and fill in some of their personal information. Which form is available in the login page. When registered become a user in this system, his or her user ID, password and payment sheet can be gotten to his or her email. After those users can access the system. Users can go directly and select vehicles. But guest users cannot select the offers vehicles. All the information is stored in the database. The registered user should pay the payment for an order.

When the registered users enter this system, those users must enter the username, user ID and password.in this system checks the validity of user login credentials. After users must select and purchase vehicles according to their consent. The system shows the vehicles type, vehicle price per day, per week or per month, sheet capacity, Gear transmission type (automatic, manual or trip tonic) like details. After the selected vehicle type, the user must enter the payment detail.

The system admin updates the vehicle category list daily and who will check detail of all users and payment sheets and separate the cost of vehicles (Tyers cost, fuel cost and all vehicles-maintained cost) and profit.

Requirements Analysis

- ✓ Customer registers to the system as a guest
- ✓ Check validity of the user registration details (username, user ID and password)
- ✓ Search vehicle types
- ✓ View the vehicles categories and its details
- ✓ Registered user sends feedback to the system
- ✓ Check the membership status
- ✓ Registered users edit the account detail
- ✓ User can see the edit detail
- ✓ Check validity of the edit details
- ✓ View the daily offers
- ✓ Request for the available offers
- ✓ Reserve the vehicle
- ✓ View total amount of vehicles
- ✓ Change the vehicles type
- ✓ Cancel the vehicle type
- ✓ Submit vehicle Type of Detail
- ✓ Select the Payment Method
- ✓ Enter the payment details
- ✓ Check the validity of the payment details
- ✓ System admin login to website
- ✓ Check the validity of the admin login credentials
- ✓ Update the system and database
- ✓ Generate the reports
- ✓ Reply to feedback given by user
- ✓ Manage user accounts
- ✓ Manager login as an admin
- ✓ Check the validity of the manager login credentials
- ✓ Add new vehicles to the system
- ✓ Update the system and database
- ✓ Remove already rented vehicles
- ✓ Check the vehicle reservations

- ✓ Confirm the vehicle reservations
- ✓ Maintain the website properly
- ✓ Making the security issues
- ✓ Update design of the website (All tabs)
- ✓ View reports (monthly, daily, and weekly)

Data Requirements

- User ID
- First Name
- Last Name
- User Telephone
- User Address
- User Email
- User Password
- User Type
- Registration Date
- Vehicle ID
- Vehicle Type
- Vehicle Name
- Vehicle Status
- Vehicle Category
- Daily Vehicle Rent Price
- Offer ID
- Offer Type
- Offer Rate
- Order ID
- Order Type
- Order Date
- Rental Days
- Order Value
- Insurance Company Number
- Insurance Company Branch
- Insurance Company Name
- Payment ID
- Payment Type
- Card Type
- Card No
- Expiry Date of Card

- CVV Code
- Feedback ID
- Description

Non-Functional Requirements

- **Availability -**

24 hours and 7 (24/7) days our services will be provided.

- **Maintainability –**

Maintainability helps repair and modify the system.

- **User friendliness –**

The system should be user-friendly for all users. Because users like to use user friendly system every time.

- **Security –**

Security is the essential part of the system. The system will be hacked.so strong security password is helped to prevent the hacker's accessing.

- **Performance-**

Lot of users can access to the system same time.at that that time, The performance should be extremely high.

- **Attractive -**

Attractive is also an essential part of system. System interface page should have highly creative, attractive, simple, and eye-catching images for huge customer base.

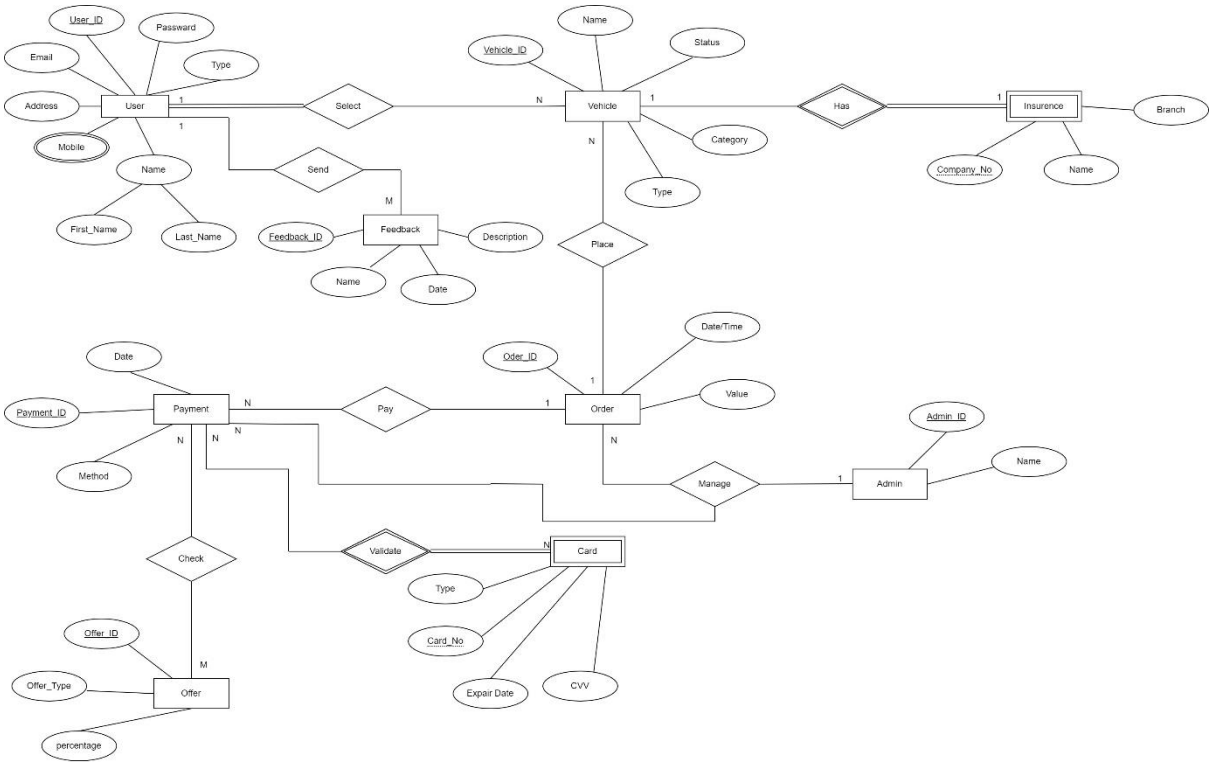
- **Robustness –**

The number of failures must be decreased in the system. System speed and data store capacity should be high.

- **Reliability –**

System should be smooth for the users, failures should be very low, and speed will be extremely high.

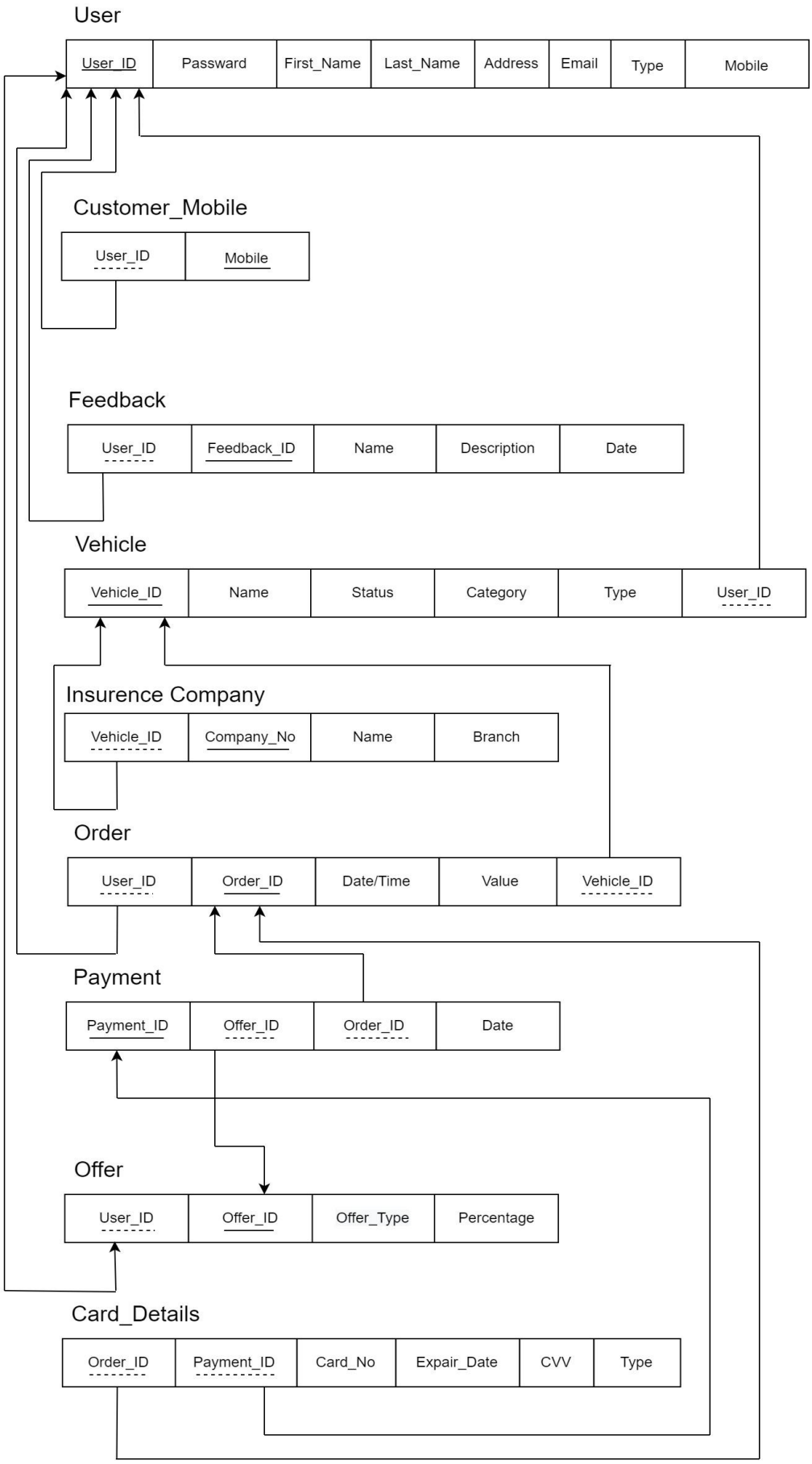
ER Diagram


User_ID
Password
Email
Type
Address
User
Mobile
Name
First_Name
Last_Name
Select
Send
Feedback
Feedback_ID
Description
Name
Date
Vehicle_ID
Name
Status
Vehicle
Category
Type
Has
Insurence
Branch
Company_No
Name
Place
Date
Payment_ID
Payment
Method
Pay
Oder_ID
Order
Date/Time
Value
Admin_ID
Name
Admin
Manage
Check
Validate
Card
Type
Card_No
Expair Date
CVV
Offer_ID
Offer_Type
Offer
percentage

Schema of the database

1. User (User_ID, Frist_Name, Last_Name, User_Telephone, User_Address, User_Email, User_Password, User_Type, Registation_Date)
2. Vehicle_Info (Vehicale_ID, Vehicale_Name, Vehicale_Type, Vehicale_Category, Vehicale_Status, Daily_Rental_LKR)
3. Offers (Offer_ID, Offer_Type, Vehicale_ID, Offer_Rate_Percentage)
4. Orders (Order_ID, Vehicale_ID, Payment_ID, User_ID, Rental_Days, Order_Value, Order_Date)
5. Insurance (Vehicale_ID, Company_No, Name, Branch)
6. Payment (Order_ID, Payment_ID, Payment_Type, Offer_ID)
7. Card_details (Card_Type, Card_no, Expiry_date, CVV, Order_ID, Payment_ID)
8. Feedback (User_ID, Feedback ID, Frist_Name, Description, Order_Date)

Relational Schema



SQL Queries

```
CREATE TABLE User_Data(
User_ID CHAR(8) NOT NULL,
First_Name VARCHAR(30),
Last_Name VARCHAR(30),
User_Telephone VARCHAR(10),
User_Address VARCHAR(100),
User_Email VARCHAR(30) NOT NULL,
User_Password VARCHAR(15) NOT NULL,
User_Type VARCHAR(10),
Registration_Date DATETIME,
CONSTRAINT User_PK PRIMARY KEY(User_ID),
CONSTRAINT Phone CHECK (User_Telephone LIKE '[0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-
9][0-9][0-9]'),
CONSTRAINT pWord CHECK (DATALENGTH(User_Password)>=8),
CONSTRAINT mail CHECK (User_Email LIKE '%@%')
);

CREATE TABLE Vehicle_Info(
Vehicle_ID VARCHAR(10) NOT NULL,
Vehicle_Name VARCHAR(15),
Vehicle_Type VARCHAR(15),
Vehicle_Category VARCHAR(20),
Vehicle_Status VARCHAR(10),
Daily_Rental_LKR MONEY,
CONSTRAINT Vehicle_PK PRIMARY KEY(Vehicle_ID)
);

CREATE TABLE Offers(
Offer_ID CHAR(8) NOT NULL,
Offer_Type VARCHAR(15),
Vehicle_ID VARCHAR(10),
Offer_Rate_Percentage INT,
CONSTRAINT Offers_PK PRIMARY KEY(Offer_ID),
CONSTRAINT Offers_FK FOREIGN KEY(Vehicle_ID) REFERENCES Vehicle_Info(Vehicle_ID)
);

CREATE TABLE Orders(
Order_ID VARCHAR(8) NOT NULL,
Vehicle_ID VARCHAR(10),
Payment_ID INT NOT NULL,
User_ID CHAR(8),
Rental_Days INT,
Order_Value MONEY,
Order_Date DATETIME,
CONSTRAINT Orders_PK PRIMARY KEY(Order_ID),
CONSTRAINT Orders_FK1 FOREIGN KEY(User_ID) REFERENCES User_Data(User_ID)
);

CREATE TABLE Insurance(
Vehicle_ID VARCHAR(10),
Company_No INT NOT NULL,
Name VARCHAR(35),
Branch VARCHAR(20),
CONSTRAINT Insurance_PK PRIMARY KEY(Company_No),
CONSTRAINT Insurance_FK FOREIGN KEY(Vehicle_ID) REFERENCES Vehicle_Info(Vehicle_ID)
);
```

```
CREATE TABLE Payment(
Order_ID VARCHAR(8),
Payment_ID INT NOT NULL,
Payment_Type VARCHAR(12),
Offer_ID CHAR(8),
CONSTRAINT Payment_PK PRIMARY KEY(Payment_ID),
CONSTRAINT Payment_FK FOREIGN KEY(Order_ID) REFERENCES Orders(Order_ID)
);

CREATE TABLE Card_details(
Card_Type VARCHAR(20),
Card_no CHAR(16),
Expiry_date DATE,
CVV INT,
Order_ID VARCHAR(8),
Payment_ID INT,
CONSTRAINT Card_details_PK PRIMARY KEY(Card_no),
CONSTRAINT CVV_Num CHECK (DATALENGTH(CVV)=3 OR DATALENGTH(CVV)=4),
CONSTRAINT Card_details_FK1 FOREIGN KEY(Order_ID) REFERENCES Orders(Order_ID),
CONSTRAINT Card_details_FK2 FOREIGN KEY(Payment_ID) REFERENCES Payment(Payment_ID)
);

CREATE TABLE Feedback(
User_ID CHAR(8),
Feedback_ID VARCHAR(10) NOT NULL,
First_Name VARCHAR(30),
Description VARCHAR(100),
Order_Date DATETIME,
CONSTRAINT Feedback_PK PRIMARY KEY(Feedback_ID),
CONSTRAINT Feedback_FK FOREIGN KEY(User_ID) REFERENCES User_Data(User_ID)
);

INSERT INTO User_Data VALUES('U0000001','Tharaka','Madushan','0711234567','504 B/3,
School Lane, New Town,
Ratnapura','tharaka.tmw7@gmail.com','W+2@chj=7Tm9','ADMIN','2022-02-07');
INSERT INTO User_Data
VALUES('U0000002','Sulaksha','Wanshathilake','0721234567','No.25, Dambulla Road,
Habarana','sahanperera003@gmail.com','mg1$toyou','MANAGER','2022-02-28');
INSERT INTO User_Data VALUES('U0000003','Hashan','Madhuwantha','0731234567','1st
Street, Walasmulla, Hambantota','hashan@email.com','#HshnM@01','CUSTOMER','2022-04-
27');
INSERT INTO User_Data VALUES('U0000004','Chamindu','Jayanath','0741234560','No.12.,
Kaduwela Road, Pittugala','sulacha_12@yahoo.com','7Tm9n)lk/?','CUSTOMER','2022-04-
18');
INSERT INTO User_Data VALUES('U0000005','Vishak','Nayanajith','0751234567','No.13,
Colombo Road, Yakkala','vishak2000@outlook.com','v=u+at@@','CUSTOMER','2022-03-03');
INSERT INTO User_Data VALUES('U0000006','Dilusha','Punsara','0761234568','New Kandy
Road, Malabe','newsara@mailer.com','SQLnothing$','CUSTOMER','2022-04-02');
INSERT INTO User_Data VALUES('U0000007','Rangana','Herath','0771234569','100/14, Galle
Road, Colombo 7','ranganacolombo@outlook.com','147#Rang','CUSTOMER','2022-04-04');

INSERT INTO Vehicle_Info VALUES('CAB-5478','Wagon R','Car','General','Reserved',
2500);
INSERT INTO Vehicle_Info VALUES('PS-3456','Toyota KDH','Van','Luxury','Reserved',
7000);
INSERT INTO Vehicle_Info VALUES('CAD-6771','Toyota Axio','Car','General','Available',
4000);
INSERT INTO Vehicle_Info VALUES('PA-3421','Toyota Hilux','Cab','General','Available',
8500);
INSERT INTO Vehicle_Info VALUES('CBD-0707','BMW i8','Car','Luxury','Available',
20000);
```

```
INSERT INTO Vehicle_Info VALUES('PB-1031','Demo
Batta','Lorry','Industrial','Available', 2000);
INSERT INTO Vehicle_Info VALUES('KQ-1966','Toyata Premio', 'Car','General',
'Available', 4500);
INSERT INTO Vehicle_Info VALUES('CAL-1818', 'KIA', 'Car','Luxury', 'Available', 3000);
INSERT INTO Vehicle_Info VALUES('252-4521', 'Toyota Dolphin', 'Van','General',
'Available', 17000);
INSERT INTO Vehicle_Info VALUES('BAT-7895', 'Honda Dio', 'Motor Bike','General',
'Reserved', 2000);
INSERT INTO Vehicle_Info VALUES('EL-0003', 'Moris Miner', 'Car','Classical',
'Available', 2000);
INSERT INTO Vehicle_Info VALUES('12-1252', 'Vox Wagon Van', 'Van','Classical',
'Available', 3000);
INSERT INTO Vehicle_Info VALUES('ZA-3525 ', 'JCB', 'Excavator','Industrial',
'Available', 25000);
INSERT INTO Vehicle_Info VALUES('LL-2882', 'TATA', 'Tipper','Industrial', 'Available',
17000);
INSERT INTO Vehicle_Info VALUES('LZ-1031', 'Renault', 'Cargo Carrier','Industrial',
'Available', 35000);
INSERT INTO Vehicle_Info VALUES('AAT-1253', 'Bajaj', 'Tuk Tuk','General', 'Available',
4500);
INSERT INTO Vehicle_Info VALUES('CBB-5558', 'Montero', 'Jeep','Luxury', 'Available',
33000);
INSERT INTO Vehicle_Info VALUES('LZ-6200', 'Volvo Hearse', 'Funereal Car','Other',
'Available', 24000);
INSERT INTO Vehicle_Info VALUES('LZ-0001', 'Benz Hearse', 'Funereal Car','Other',
'Available', 25000);
INSERT INTO Vehicle_Info VALUES('PP-2569', 'Toyota Hiace', 'Ambulance','Other',
'Available', 19000);
INSERT INTO Vehicle_Info VALUES('LK-1258', 'Isuzu', 'Mobile Crane','Industrial',
'Available', 29000);
INSERT INTO Vehicle_Info VALUES('ND-4737', 'Ashok Leyland', 'Buses','General',
'Available', 28500);
INSERT INTO Vehicle_Info VALUES('NG-0045', 'King Long', 'Buses','Luxury', 'Available',
50000);
INSERT INTO Vehicle_Info VALUES('CAU-1425', 'Peugeot SUV', '4WD & SUV','Luxury',
'Available', 22000);

INSERT INTO Offers VALUES('OFFG883','Gold Offer','CAB-5478',10);
INSERT INTO Offers VALUES('OFFS678','Silver Offer','PS-3456',5);
INSERT INTO Offers VALUES('OFFP688','Platinum Offer','CAD-6771',20);
INSERT INTO Offers VALUES('OFFS658','Silver Offer','PA-3421',5);
INSERT INTO Offers VALUES('OFFG251','Gold Offer','CBD-0707',10);

INSERT INTO Orders VALUES('O000001','KQ-1966',123451,'U0000006',2,9000,'2022-04-04');
INSERT INTO Orders VALUES('O000002','CAL-1818',123452,'U0000007',1,3000,'2022-04-04');
INSERT INTO Orders VALUES('O000003','CAD-6771',123453,'U0000005',4,16000,'2022-03-
04');
INSERT INTO Orders VALUES('O000004','PA-3421',123454,'U0000004',2,17000,'2022-04-20');
INSERT INTO Orders VALUES('O000005','CBD-0707',123455,'U0000003',1,20000,'2022-04-
28');

INSERT INTO Insurance VALUES('KQ-1966',45985,'Ceylinco Insurance - On the
Spot','Malabe');
INSERT INTO Insurance VALUES('CAL-1818',35156,'Janashakthi Insurance PLC','Sri
Jayawardhanapura');
INSERT INTO Insurance VALUES('CAD-6771',84896,'Sri Lanka Insurance','Embilipitiya');
INSERT INTO Insurance VALUES('PA-3421',32156,'Peoples Insurance PLC','Nittambuwa');
INSERT INTO Insurance VALUES('CBD-0707',54781,'HNB General Insurance','Matara');

INSERT INTO Payment VALUES('O000001',123451,'PayHere','NO_OFFER');
INSERT INTO Payment VALUES('O000002',123452,'Cash','NO_OFFER');
```

```
INSERT INTO Payment VALUES('O000003',123453,'Bitcoin','OFFP6880');
INSERT INTO Payment VALUES('O000004',123454,'Visa/Master','OFFS6580');
INSERT INTO Payment VALUES('O000005',123455,'Cash','OFFG2510');

INSERT INTO Card_details VALUES('VISA','9876456712344321','2025-02-
28',123,'O000005',123455);
INSERT INTO Card_details VALUES('MasterCard','3454678912134464','2023-01-
06',987,'O000004',123454);
INSERT INTO Card_details VALUES('American Express','3124856712346791','2022-09-
13',7120,'O000003',123453);
INSERT INTO Card_details VALUES('VISA','5428456734518729','2026-03-
17',963,'O000001',123451);
INSERT INTO Card_details VALUES('VISA','4201546284523684','2024-11-
10',456,'O000002',123452);

INSERT INTO Feedback VALUES('U0000003','FB00000005','Hashan','Very satisfied... Hope
to rent again.','2022-04-30');
INSERT INTO Feedback VALUES('U0000004','FB00000004','Chamindu','Exellent
service!','2022-04-22');
INSERT INTO Feedback VALUES('U0000005','FB00000003','Vishak','It was a great
deal.','2022-04-09');
INSERT INTO Feedback VALUES('U0000006','FB00000002','Dilusha','Nice company.
Recommended.','2022-04-06');
INSERT INTO Feedback VALUES('U0000007','FB00000001','Rangana','I am not happy about
the service.','2022-04-05');
```

Description of database performance

The system availability and speed can be defined as the performance. This system works without any issues and failures while searching vehicles, while updating the vehicles list, while loss of speed, while doing navigation and while doing transactions.

1. System Resources
2. Work Lords
3. Throughput
4. Connection
5. Optimization

1. System Resources

System owned software and hardware are referred to as system resources. System resources are used to compute the memory of the computer and the amount of RAM available. Software systems installed on a computer can be presented as resources.

System resources example:

- Cache controller
- Include memory
- Such as Database kernel

2. Workload

This method is used to solve more serious problems that arise for clients. This is the most important support to explain the role of the system. Fully explaining the role of the system to the clients can minimize the problems they cause.

Workload management consists of the following components.

- Services Available
- Balancing related things
- A framework to ensure high availability
- Balanced and complete discourse

Workload Example:

- Map reduction, memory / storage / computer resource intensive application analysis.
- So many heavy month final adjustments in the payroll

3. Throughput

The ability to process data in a system is called throughput. Here it is important to know the capabilities and capabilities of the hardware associated with DBMS.

Throughput Example:

- Hard Disk Capacity and Functionality
- Capacity and functionality of the RAM
- Quality of internet service
- In data transmission
- Network throughput

4. Contention

This is a situation where two or more functions are used interchangeably.

Contention Example:

- As the active components increase, there is competition between them for sharing resources. As competition increases, so does output.
- When the same data is updated twice, the output is weak.

5. Optimization

Optimization is the timely upgrade of a system to make it work more efficiently and smarter.

Optimization Example:

- SQL formulation
- Database configuration parameters
- Table design
- Data distribution

Performance Requirements

Below are some of the activities we have undertaken to improve the performance of our system.

- Simple design to make it easy for the user.
- Eliminate performance by using simple codes and treat it as an essential factor.
- Using the database to improve system performance.
- The need here is to be able to torture fast without getting stuck.
- The system always needs to work flawlessly.
- Also, the colors, fonts, font size, etc. used in creating the system should be favorable to the people using it.

Security Requirements

The security of a system plays a very important role. This category includes specific requirements that must be met for the system to survive and function properly. Meeting these security requirements is important to build trust in the system among users and users of the system.

The following factors depend on security requirements.

- Business Secrets.
- Future Plans
- Assets owned by the system
- Information on cash transactions
- Sensitive information of system users

Security Requirement in car rental system

- The system also recruits new members and authorizes them to transact with the administrator.
- Verification of all important transactions in the system by user id.
- Content data can only be accessed and accessed by authorized users.
- Ensure the confidentiality of all clients' personal information and payment information.
- Ability to withstand vulnerable cyber-attacks and data theft.
- Mandate encryption of all data exchanged across the system.
- Appoint a Security Manager to oversee system security.